Phase 1 Heritage Impact Assessment for proposed establishment of agricultural pivots on Farm Naauwtes Fontein 78, Hopetown, NC Province.

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Summary

A Phase 1 Heritage Impact Assessment was carried out for the proposed installation of new irrigation pivots and associated infrastructure at two proposed sites located on the farm Naauwtes Fontein 78 near Hopetown in the Northern Cape Province. Two areas, designated Sites A and B were identified for assessment. Site A comprises four pivot footprints covering a total of 198 ha and Site B comprises two pivot footprints covering a total of 71 ha. The field assessment indicates that Sites A and B are located on fairly low topography terrain with limited outcrop visibility. The terrain is capped by a well-developed calcareous soil, and unconsolidated windblown sand with a thickness of > 80 cm. No evidence was found of *in situ* Stone Age material or capped assemblages within the sandy substrate. No fossils (Quaternary) or fossil exposures were observed in the footprint areas. There are no indications of prehistoric structures or rock art or aboveground evidence of graves or historical structures older than 60 years within the confines of the footprints. The proposed pivot development at Sites A and B will primarily affect geologically recent and culturally sterile soils (unconsolidated wind-blown sand). The footprints are not considered palaeontologically or archaeologically vulnerable and are assigned a site rating of Generally Protected C.

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Introduction

A Phase 1 Heritage Impact Assessment was carried out for the proposed installation of new irrigation pivots and associated infrastructure at two proposed sites located on the farm Naauwtes Fontein 78 near Hopetown in the Northern Cape Province (**Fig. 1**). The extent of the proposed development (over 5000 m2) falls within the requirements for a Heritage Impact Assessment (HIA) as required by Section 38 (Heritage Resources Management) of the South African National Heritage Resources Act (Act No. 25 of 1999). The site visit and subsequent assessment took place in November 2013. The task involved identification of possible archaeological and paleontological sites or occurrences in the proposed zone, an assessment of their significance, possible impact by the proposed development and recommendations for mitigation where relevant.

Methodology

The palaeontological and archaeological significance of the affected area was based on existing field data, database information, published literature and maps. This was followed up with a field assessment by means of a pedestrian survey and investigation of all exposed sections within the footprint. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes.

Site significance classification standards prescribed by SAHRA (2005) were used to indicate overall significance and mitigation procedures where relevant (**Table 1**).

Locality Data

Maps: 1:50 000 topographical map 2923 DB Rooidam

1:250 000 geological map 2922 Prieska

The proposed development footprints are located next to the R3112 going to Prieska, about 19 km northwest of Hopetown on the farm Naauwtes Fontein 78 (**Fig. 2).** Two areas, designated Sites A and B were identified for assessment (**Fig. 3**). Site A comprises four pivot footprints covering a total of 198 ha and Site B comprises two pivot footprints covering a total of 71 ha (**Fig. 3).**

Site Centroid Coordinates

Site A, 55 ha; 29°30'29.22"S 23°56'29.88"E

Site A, 55 ha; 29°30'45.75"S 23°56'54.34"E

Site A, 15 ha; 29°30'50.25"S 23°56'31.27"E

Site A, 20 ha; 29°31'3.87"S 23°56'40.47"E

Site B, 7 ha; 29°31'5.09"S 23°58'1.62"E

Site B, 40 ha; 29°31'11.65"S 23°58'19.34"E

Background

Palaeontology

Downcutting and incision by the Orange river indicate that region is underlain by Precambrian, Ventersdorp Supergroup lavas (Allanridge Formation, *Ra*), which is composed of resistant-weathering, dark green lavas and associated pyroclastic rocks (Zawada 1992) (**Fig. 4**). Outcropping further southeast of the study area, the Ventersdorp lavas are unconformably overlain by Dwyka Group tillites of the Mbizane Formation (*C-Pd*), a a largely heterolithic unit recognized in the upper part of the Dwyka Group of the Karoo Supergroup (Von Brunn & Visser 1999; Visser et al. 1977-78, 1990; Zawada 1992; Johnson et al. 2006). It represents valley and inlet fill deposits left behind on Ventersdorp basement rocks by retreating glaciers about 300 million years ago. These Dwyka-aged palaeovalleys bear evidence of glaciated pavements, consisting of well-preserved polished surfaces striations on basement rocks, which abound throughout the area (McLachlan and Anderson 1973). The Mbizane Formation is not considered to be highly fosilliferous, but low diversity non-marine ichnofossil assemblages have been recorded as well as scarce vascular plant remains associated with *Glossopteris* Flora, while palynomorphs are also likely to be present within finer-grained mudrock facies (Almond and Pether 2008).

Localized outcrops of Early Permian, Whitehill Formation mudrocks (Ecca Group, *Ppw*) generally occur near Jurassic dolerite contact zones, outcropping north, south and east of Hopetown (Zawada 1992). Fossils from the Whitehill Formation (Ecca Group) include mesosaurid reptiles, crustaceans, palaeoniscoid fish, fossil wood and leaves (*Glossopteris*), sponge spicules and ichnofossils (Cole and Basson 1991).

Dolerite, in the form of dykes and sills, is common throughout the region. Regarded as feeders of Drakensberg lavas, dolerites are not palaeontologically significant and can be excluded from further consideration in the present evaluation. On the other hand, dolerite outcrop, together with Ventersdorp andesites, can be regarded as

archaeologically significant since Stone Age lithic artifacts in the region are mostly made of andesite or hornfels, the latter being a fine-grained isotropic rock found in the hot-contact zone between the dolerites and shales in the area. As a result, stone tool factory sites are commonly found near dolerite-shale contact zones. In addition, rock engravings in the region are consistently found on dolerite.

According to the 1:250 000 geological map 2922 Prieska, the study areas are mantled by unconsolidated Kalahari Group sand (*Qs*) and alluvium along stream incisions associated with the nearby Orange River.

To the northwest of Hopetown the landscape is dissected by the ancient Koa Valley, a Miocene relic with remnants of Cenozoic fluvial deposits that has produced fossil vertebrate bone as well as fossil wood. Southwards, the Koa Valley joins an extensive system of pans fossil where vertebrate fossil remains have been identified. No fossils have been explicitly reported from Quaternary alluvial deposits near Hopetown yet, but a variety of fossil fauna have been retrieved from alluvial gravel terraces along the Lower Vaal River basin northeast of Kimberly (Cooke 1949; Maglio and Cooke 1978; Partridge and Maud 2000). Here, gravel terraces contain sandy lenses that have yielded several extinct vertebrate taxa including proboscidians *(Mammuthus subplanifrons* and *Elephas iolensis),* suids (*Notochoerus capensis*) and a variety of bovids.

Archaeology

The Stone Age archaeological footprint is well-represented north of Hopetown and around Kimberley by Early and Middle Stone Age localities from lacustrine and alluvial contexts as well as rock engravings on dolerite outcrop (**Fig. 6 & 7**). Engraving sites have been recorded on a number of farms in the Hopetown district, including Beeshoek, Brandfontein Disselfontein, Doornbult Karee Kloof, Lemietskop and Rooikop (**Fig. 8**). Archaeological records and historical eyewitness accounts show evidence of Bushman hunter-gatherer and Khoi herder occupation in the region prior to European settlement (Sampson 1972; Elphick 1977). Early travellers frequently encountered Koranna, Griqua and Bushmen groups in the region (Burchell 1824; Skead 2009). Iron Age occupation is absent from the region as the most southerly distribution of Iron Age settlement in the northern Cape was limited to north of the Orange River by the end of 18th century (Maggs 1974; Humphreys 1976). The Orange River area between Douglas and Hopetown also lies within the confines of the

historical Albania settlement of Griqualand West that lasted from 1866 to its demise in 1878 (**Fig. 9**) (Kurtz 1988).

Hopetown itself was established in 1854. The town experienced a boom after the discovery of diamonds 1866 and 1868, which led to the famous diamond rush of the 1870's. The historical Orange River Station and blockhouse lie on the southern bank of the Orange River, 12 kilometres east of Hopetown. South of the station lies the Doornbult concentration camp, established in 1901 by the British, which housed at least 1600 people during the Anglo-Boer War.

Field Assessment

The field assessment (see Appendix 1 for Track Log) indicates that Sites A & B are located on fairly low topography terrain with negligible outcrop visibility (**Fig. 10**). The terrain is capped by a well-developed calcareous soil, and unconsolidated windblown sand with a thickness of > 80 cm (**Fig. 10**). No evidence was found of *in situ* Stone Age material or capped assemblages within the sandy substrate. No fossils (Quaternary) or fossil exposures were observed in the footprint areas. There are no indications of prehistoric structures or rock art or aboveground evidence of graves or historical structures older than 60 years within the confines of the footprints.

Impact Statement and Recommendation

The field assessment indicates that the proposed pivot development at Sites A and B will primarily affect geologically recent and culturally sterile soils (unconsolidated wind-blown sand) (**Table 1**). The footprints are not considered palaeontologically or archaeologically vulnerable and are assigned a site rating of Generally Protected C (**Table 1**).

References

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DECLARATION OF INDEPENDENCE

I, Lloyd Rossouw, declare that I act as an independent specialist consultant. I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference. I have no interest in secondary or downstream developments as a result of the authorization of this project.

26 / 10 / 2021

Tables & Figures

Table 1. Archaeological Field Rating categories as prescribed by SAHRA.

Field Rating	**Grade**	**Significance**	**Mitigation**
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP.A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

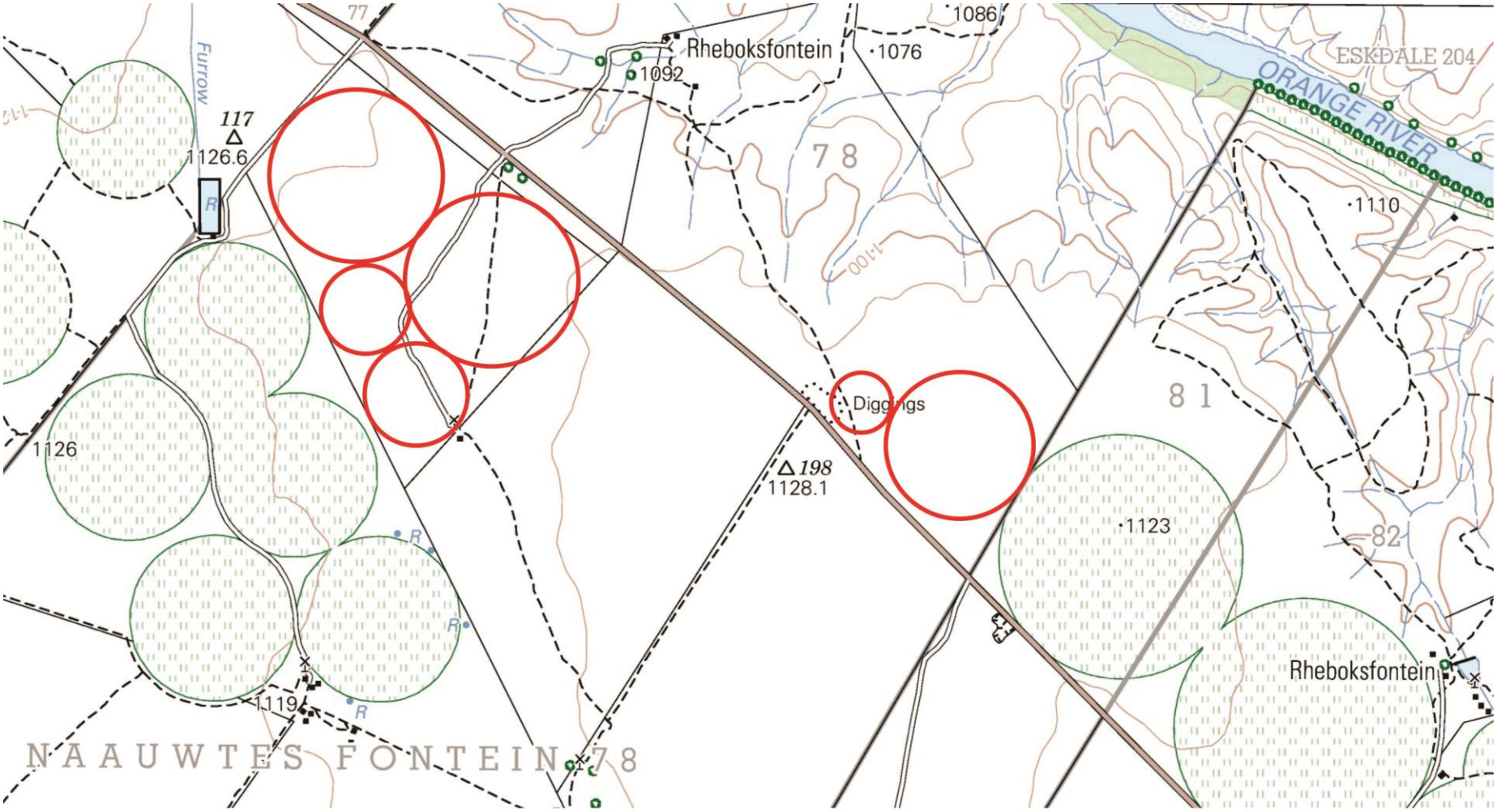


Figure 1. Map of the proposed pivot footprints (portion of 1:50 000 scale topographic map 2923DB Rooidam).

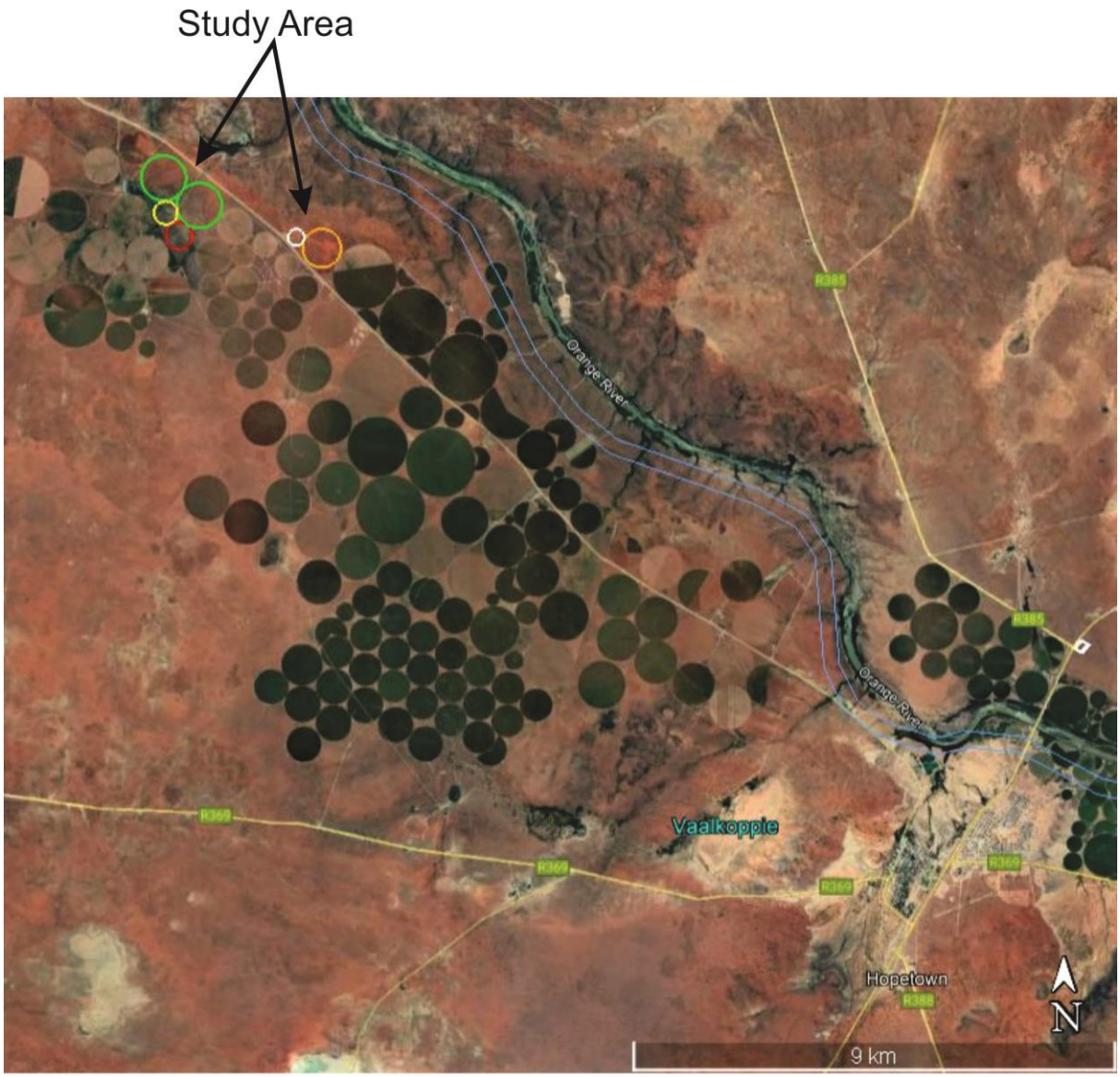


Figure 2. Position of study area in relation to Hopetown.

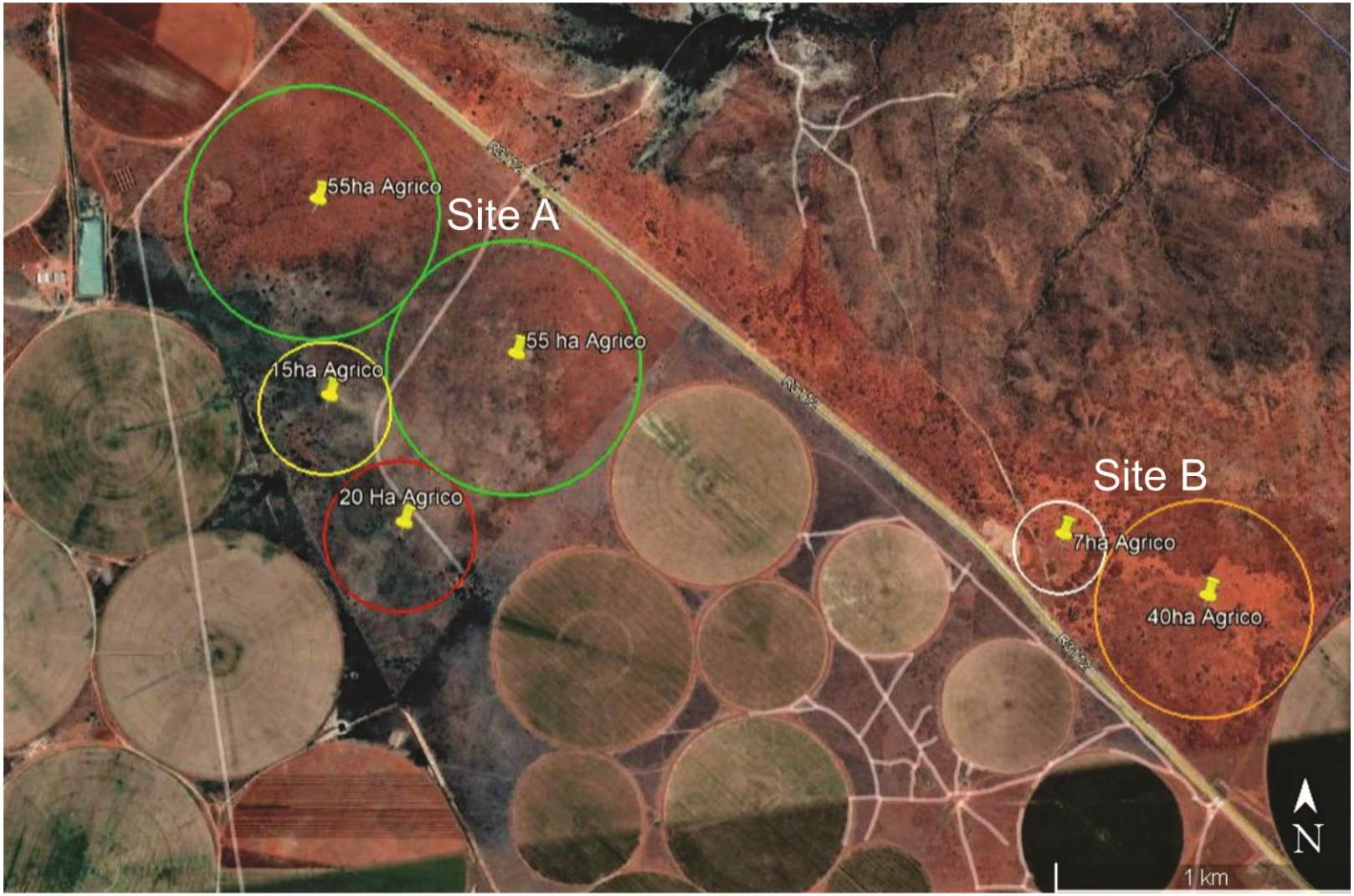


Figure 2. Aerial view of the study areas.

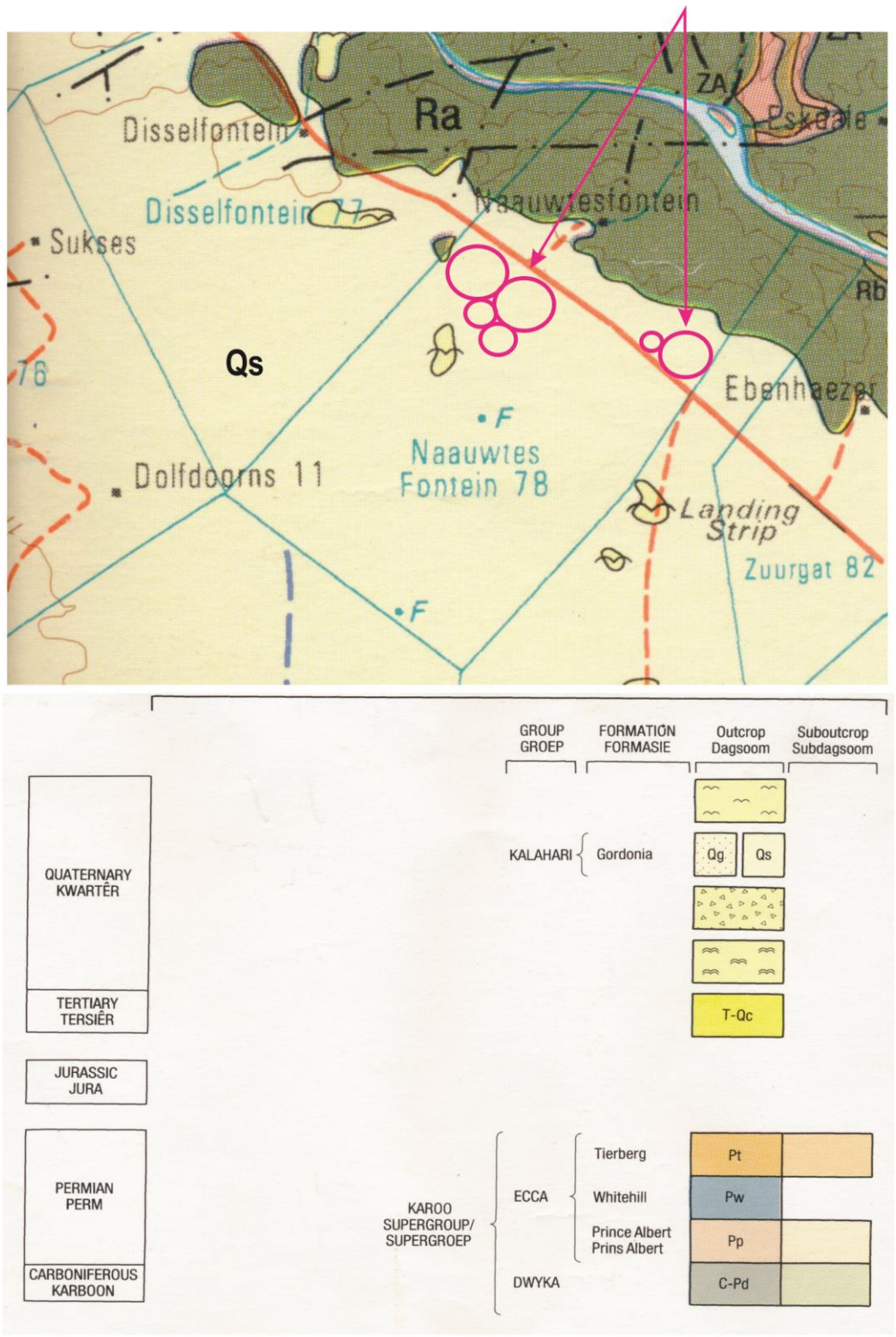


Figure 4. Portion of 1: 250 000 geological map 2922 Prieska (Council for Geoscience, Pretoria). The area around Hopetown is underlain at depth by Precambrian lavas of the Allanridge Formation (Ventersdorp Group, *Ra)* as well as Dwyka tillites (Mbizane Formation, *C-Pd*) and basal Ecca mudrocks (Whitehall Formation, *Ppw*) of the Karoo Supergroup. The basement lavas and Karoo sediments are largely overlain by Late Cenozoic (Quternary) deposits made up of calcretes, surface limestones (Qc), and Kalahari Group wind-blown sand (Qs) in the vicinity of the study area.

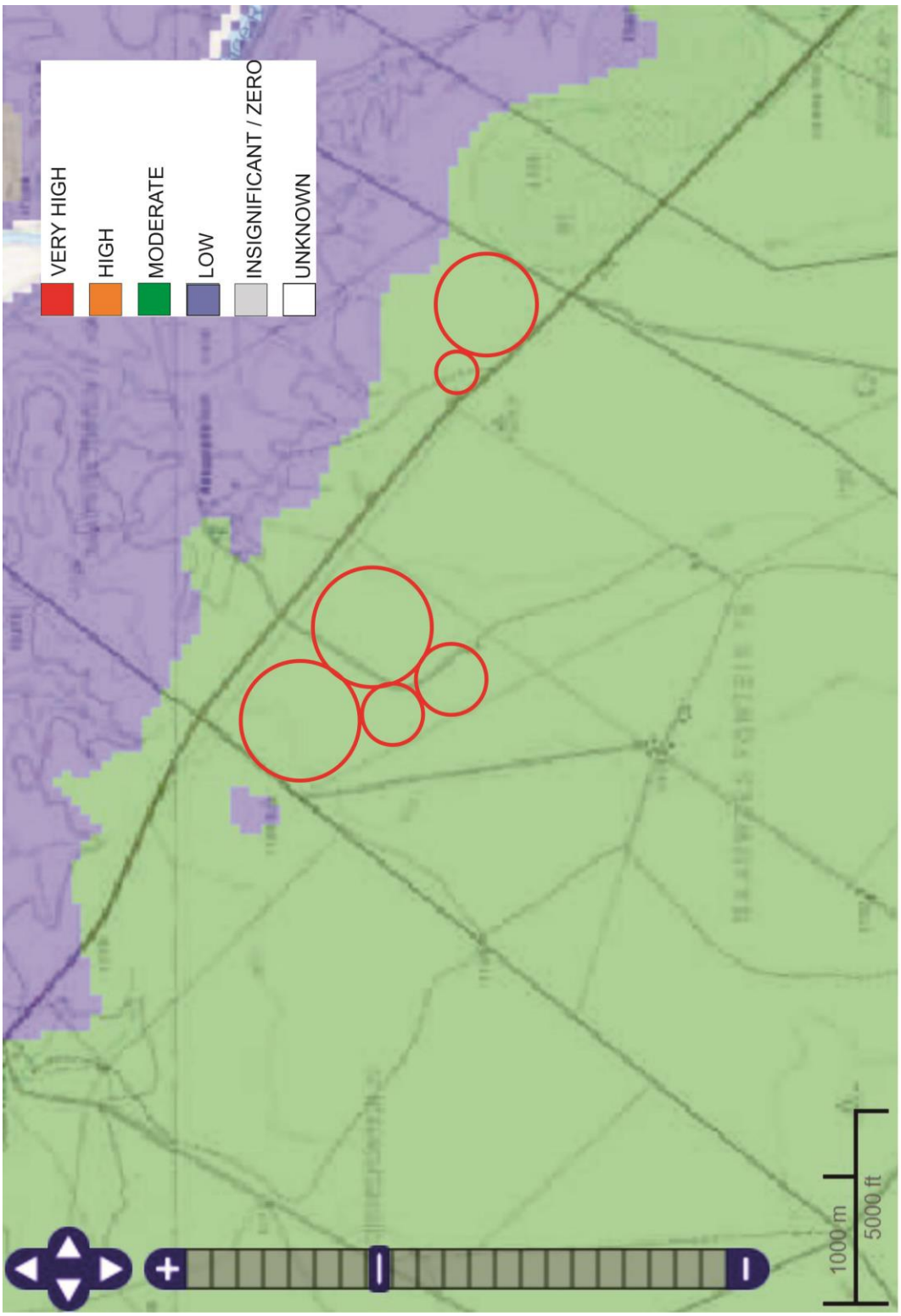


Figure 5. SAHRIS palaeosensitivity map of the study area (2021).

1. Pniel, Nooitgedacht & Powers Site - ESA, MSA and LSA
2. Canteen Koppie - ESA
3. Rooidam - ESA
4. Biesiesput - MSA
5. Driekopseiland - Glacial striations, rock engravings
6. Doornlaagte - ESA
7. Kareevloer - ESA, MSA
8. Alexandersfontein - 'palaeo-lake'
9. Liebensraum - ESA
10. Wildebeestkuil - Rock engravings
11. Witpan - Rock engravings
12. Orange River Station, Blockhouse & Concentration Camp

Figure 6. The Stone Age archaeological footprint is well-represented north of Hopetown and around Kimberley by Early and Middle Stone Age localities from lacustrine and alluvial contexts as well as rock engravings on dolerite outcrop.

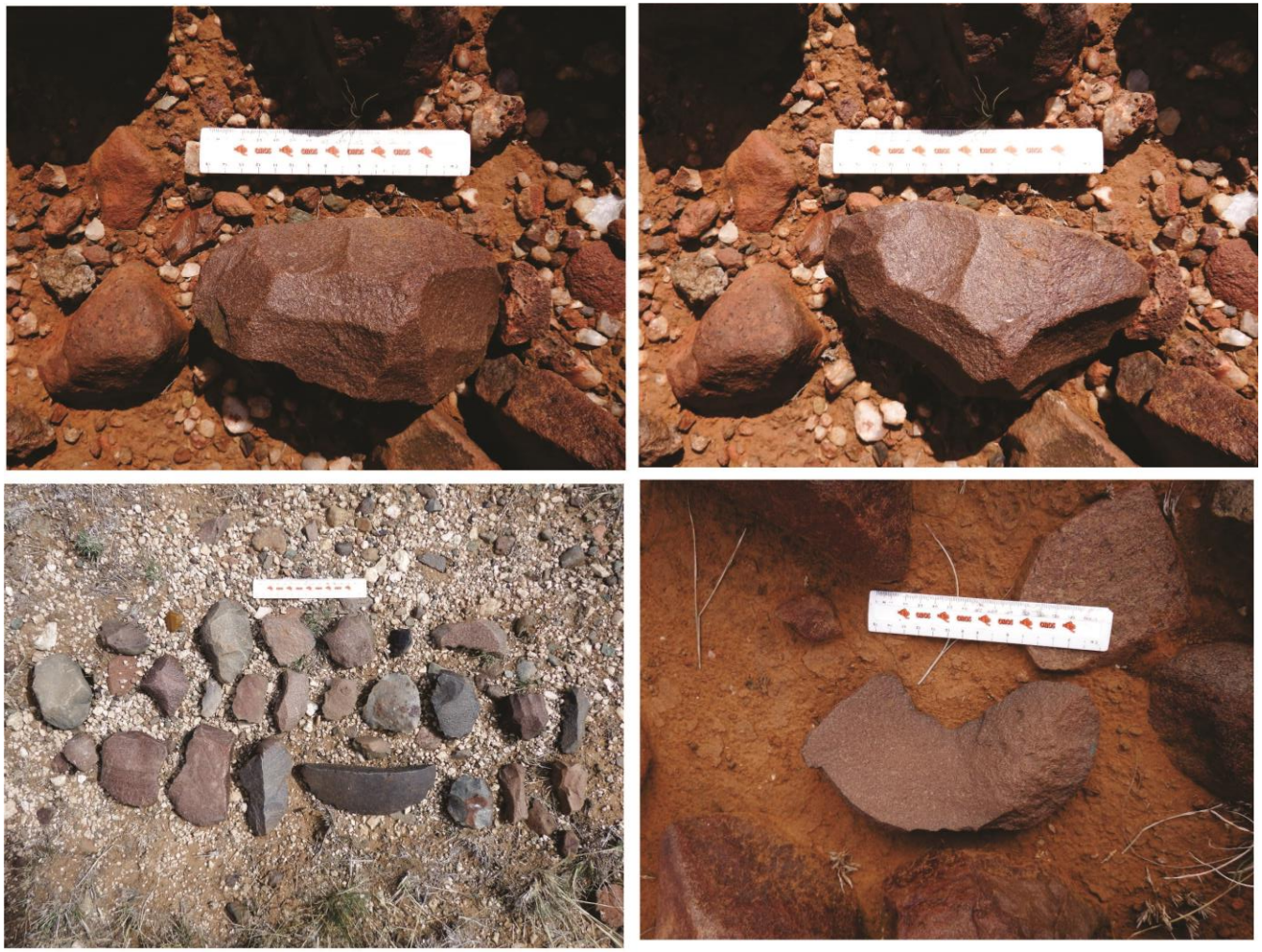


Figure 7. Individual or scatters of weathered Early and Middle Stone Age artifacts, made from Ventersdorp diabase, are a common feature generally associated with Orange River terrace and associated alluvial deposits between Hopetown and Douglas.

Figure 8. Rock engravings are common in high relief rocky terrain around Hopetown. Above depictions are representations of eland (*Taurotragus oryx*) located near the Orange River about 20 km northwest of Hopetown.
Scale 1 = 10 cm.

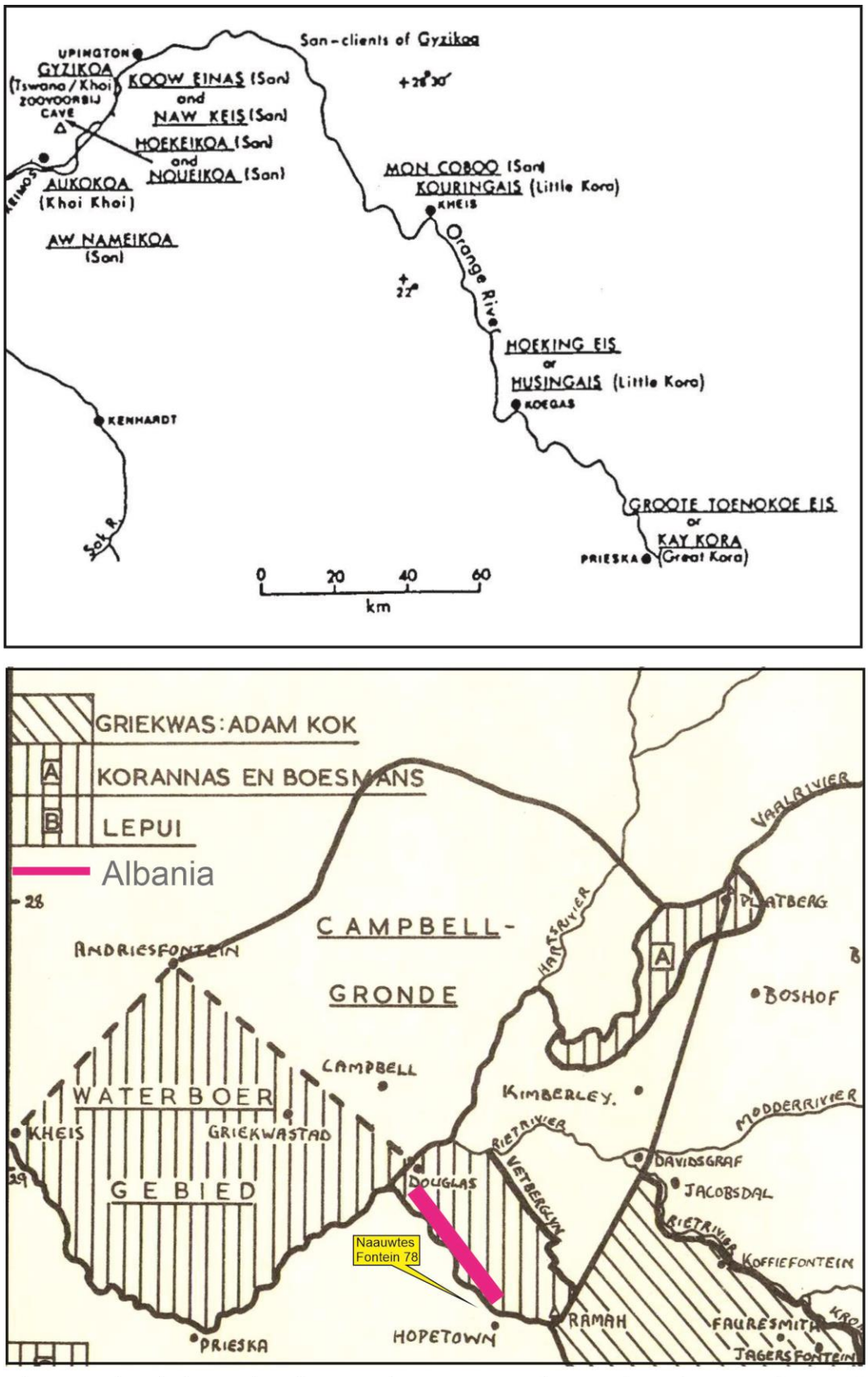


Figure 9. Historical maps based on eyewitness accounts show Bushman hunter-gatherer and Khoi herder occupation in the region prior to European settlement, e.g. Khoisan societies along the Orange River between Upinton and Prieska c. 1779 (above) while early travelers frequently encountered permanently setted Koranna, Griqua and Bushmen groups in the region c. 1850's. The historical Albania settlement of Griqualand West that lasted from 1866 until its demise in 1878 (below).

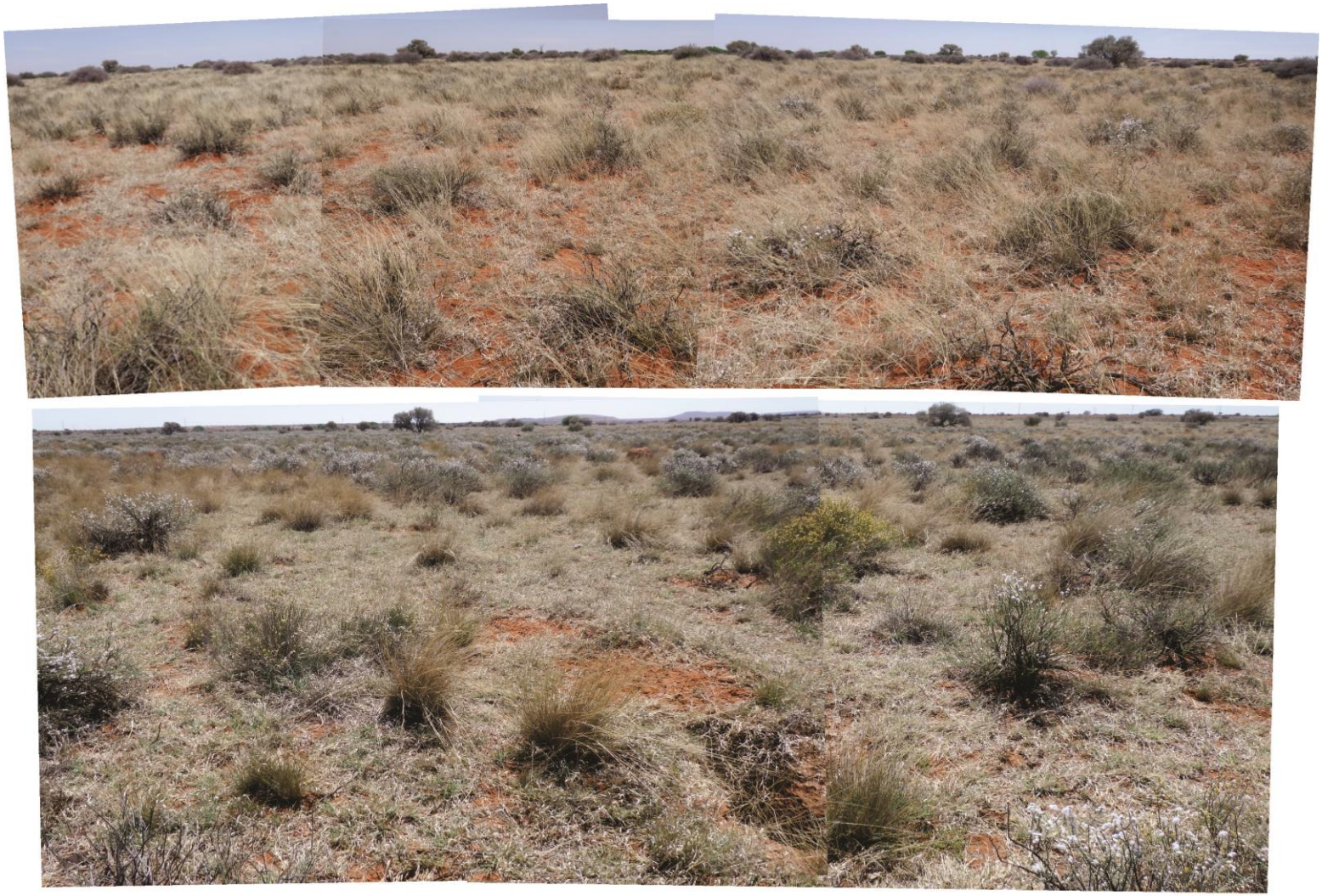


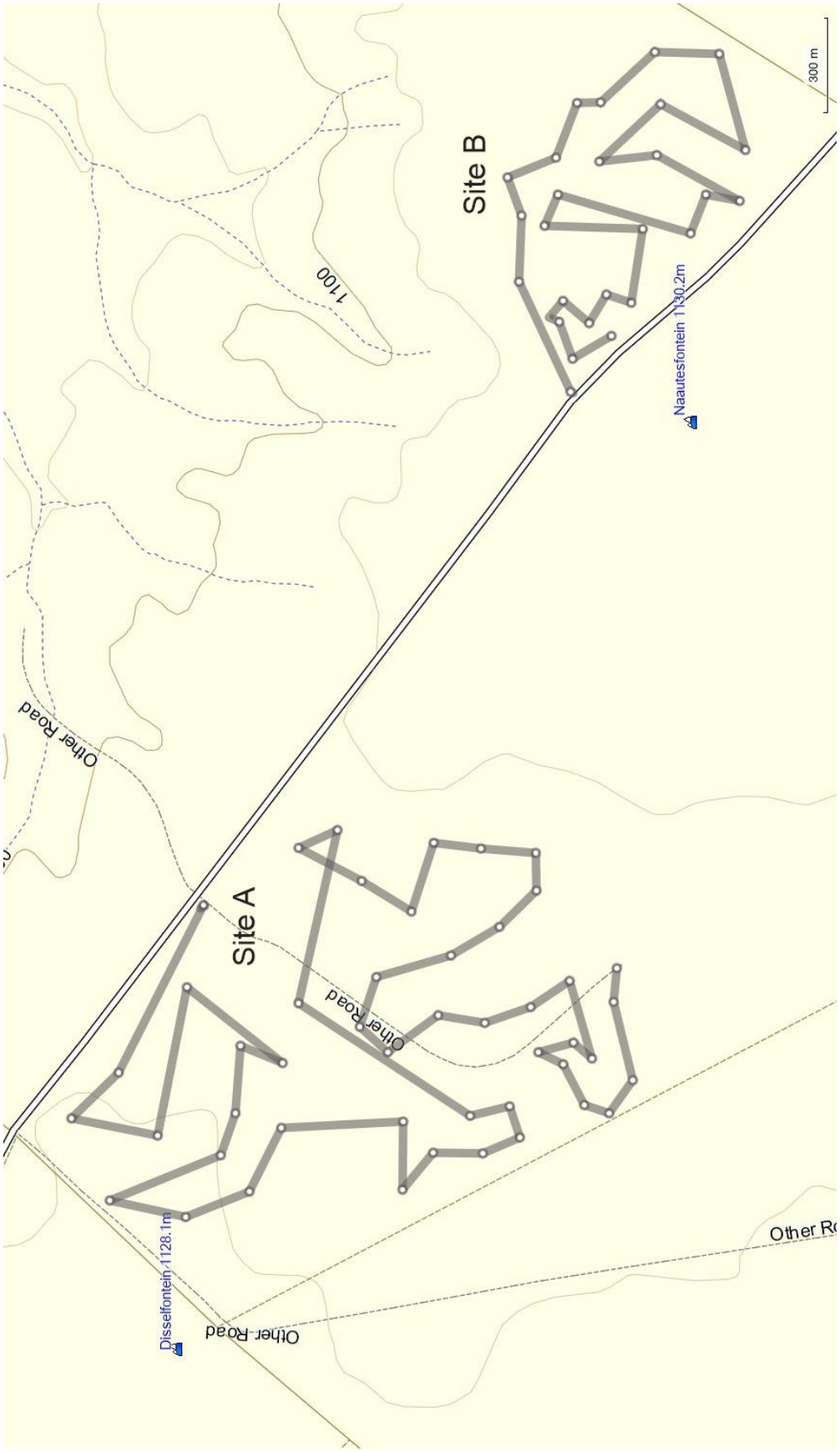
Figure 10. General view of Site A, 55 ha (North), looking west (above) and Site A, 55 ha (South) looking north (below).

Figure 11. General view of Site A, 20 ha footprint, looking northwest (above) and Site A 15 ha footprint, looking east and north (below).
Scale 1 = 10 cm.

Figure 12. General view of Site B, looking south and north (above left & right) and east (below).

Figure 13. Sites A & B are capped by a well-developed, unconsolidated windblown sand with a thickness of > 80 cm .
Scale 1 = 10 cm.

Appendix 1: Field Survey Track Log



Site A

Index	Leg	Position
1	100 m	S29 31.128 E23 56.805
2	238 m	S29 31.123 E23 56.743
3	122 m	S29 31.155 E23 56.601
4	82 m	S29 31.115 E23 56.540
5	137 m	S29 31.073 E23 56.556
6	86 m	S29 31.038 E23 56.630
7	114 m	S29 30.996 E23 56.652
8	75 m	S29 31.055 E23 56.669
9	239 m	S29 31.086 E23 56.640
10	144 m	S29 31.049 E23 56.781
11	151 m	S29 30.983 E23 56.734
12	148 m	S29 30.905 E23 56.705
13	192 m	S29 30.827 E23 56.719
14	116 m	S29 30.741 E23 56.652
15	155 m	S29 30.694 E23 56.698
16	242 m	S29 30.722 E23 56.788
17	174 m	S29 30.848 E23 56.828
18	158 m	S29 30.930 E23 56.880
19	110 m	S29 30.993 E23 56.946
20	172 m	S29 30.992 E23 57.014
21	149 m	S29 30.899 E23 57.022
22	214 m	S29 30.819 E23 57.033
23	180 m	S29 30.781 E23 56.908
24	221 m	S29 30.697 E23 56.963
25	133 m	S29 30.591 E23 57.024
26	523 m	S29 30.656 E23 57.056
27	632 m	S29 30.591 E23 56.741
28	127 m	S29 30.880 E23 56.536
29	97 m	S29 30.947 E23 56.553
30	125 m	S29 30.965 E23 56.496
31	156 m	S29 30.902 E23 56.467
32	145 m	S29 30.818 E23 56.469
33	2 m	S29 30.766 E23 56.401
34	200 m	S29 30.767 E23 56.401
35	382 m	S29 30.767 E23 56.525
36	212 m	S29 30.561 E23 56.514
37	214 m	S29 30.508 E23 56.398
38	243 m	S29 30.400 E23 56.352
39	372 m	S29 30.271 E23 56.382
40	132 m	S29 30.459 E23 56.464
41	199 m	S29 30.484 E23 56.540
42	141 m	S29 30.492 E23 56.663
43	374 m	S29 30.564 E23 56.632
44	445 m	S29 30.402 E23 56.770
45	275 m	S29 30.352 E23 56.500
46	200 m	S29 30.207 E23 56.531
47	559 m	S29 30.287 E23 56.615
48	14 m	S29 30.430 E23 56.919

49	4 m	S29 30.425 E23 56.914
50	11 m	S29 30.427 E23 56.915
51		S29 30.432 E23 56.918

Site B

Index	Leg	Position
1	139 m	S29 31.119 E23 57.956
2	116 m	S29 31.054 E23 57.914
3	35 m	S29 31.031 E23 57.981
4	66 m	S29 31.014 E23 57.989
5	105 m	S29 31.038 E23 58.019
6	100 m	S29 31.082 E23 57.979
7	82 m	S29 31.111 E23 58.031
8	220 m	S29 31.153 E23 58.016
9	308 m	S29 31.172 E23 58.150
10	101 m	S29 31.006 E23 58.156
11	431 m	S29 31.029 E23 58.213
12	124 m	S29 31.253 E23 58.142
13	108 m	S29 31.279 E23 58.213
14	293 m	S29 31.336 E23 58.201
15	181 m	S29 31.196 E23 58.285
16	255 m	S29 31.099 E23 58.273
17	298 m	S29 31.202 E23 58.377
18	294 m	S29 31.346 E23 58.294
19	202 m	S29 31.302 E23 58.469
20	225 m	S29 31.193 E23 58.472
21	74 m	S29 31.101 E23 58.381
22	174 m	S29 31.061 E23 58.380
23	163 m	S29 31.026 E23 58.280
24	121 m	S29 30.944 E23 58.244
25	195 m	S29 30.967 E23 58.175
26	362 m	S29 30.963 E23 58.054
27	0 m	S29 31.050 E23 57.854
28	5 m	S29 31.050 E23 57.854
29	14 m	S29 31.048 E23 57.851
30	2 m	S29 31.056 E23 57.851
31		S29 31.055 E23 57.851